IN THE CLAIMS

Please cancel Claims 21, 88-93, 95-98, and 101 without prejudice, as follows:

1. (Previously presented) Cardiac output measuring apparatus, comprising:

a stimulation source adapted to produce a stimulation current;

a first interface adapted to receive;

(i) first signals from a first signal source, said first signals being related at least in part to said stimulation current; and

(ii) second signals from a second signal source, said second signals being useful in the determination of cardiac output;

said first interface further comprising a multiplexer adapted to selectively multiplex individual ones of said second signals;

a selection apparatus adapted to arbitrate between individual ones of said second signals based on relative attributes of said second signals; and

a second interface adapted to at least provide output data to a monitoring device.

2. (Previously presented) The apparatus of Claim 1, further comprising data processing apparatus, said processing apparatus being adapted to process at least a portion of said first and second signals to generate said output data.

3. (Previously presented) The apparatus of Claim 2, wherein said data processing apparatus comprises:

at least one analog-to-digital converter adapted to convert at least said first signals from the analog domain to the digital domain;

a digital processor, operatively coupled to said at least one converter, adapted to process said digital domain signals.

4. (Previously presented) The apparatus of Claim 3, wherein said digital processor comprises a digital signal processor (DSP) with computer program running thereon.

5. (Previously presented) The apparatus of Claim 4, wherein said DSP comprises a pipelined processor core with arithmetic logic unit (ALU) which is optimized for at least one arithmetic operation.

6. (Previously presented) The apparatus of Claim 4, wherein said computer program comprises a program adapted to identify at least one fiducial point within at least said first signals using a wavelet transform.

7. (Previously presented) The apparatus of Claim 4, wherein said first signals comprise an impedance waveform, said second signals comprise ECG signals, and said computer program is adapted to identify at least one fiducial point within each of said impedance waveform and said ECG signals.

8. (Previously presented) The apparatus of Claim 1, wherein said second interface further comprises a network interface device adapted to facilitate transmission of said output data to said monitoring device over a data network.

9. (Previously presented) The apparatus of Claim 1, wherein said second interface comprises a wireless interface adapted to transmit said output data to said monitoring device over a wireless data link.

10. (Previously presented) The apparatus of Claim 9, wherein said second interface comprises a radio-frequency (RF) data link.

11. (Previously presented) The apparatus of Claim 9, wherein said second interface comprises an infra-red data link.

12. (Previously presented) The apparatus of Claim 9, wherein said monitoring device comprises a personal electronic device (PED) adapted to store at least a portion of said output data therein.

13. (Previously presented) The apparatus of Claim 3, further comprising a microprocessor, said microprocessor being configured to control at least a portion of the operation of said cardiac output measuring apparatus and said third interface.

14. (Previously presented) The apparatus of Claim 13, wherein said microprocessor includes a computer program adapted to generate said output data according to at least one data communication protocol.

15. (Previously presented) The apparatus of Claim 1, wherein said second source comprises a plurality of sources of ECG signals.

16. (Cancelled)

17. (Previously presented) The apparatus of Claim 3, further comprising signal filtering apparatus adapted to filter at least a portion of said first and second signals before processing by said processing apparatus.

18. (Previously presented) The apparatus of Claim 17, further comprising demodulator apparatus adapted to demodulate said filtered first signals prior to conversion thereof to the digital domain.

19. (Previously presented) The apparatus of Claim 3, further comprising apparatus adapted to measure the difference in at least two of said first signals, said difference being compared to a first predetermined value to evaluate the electrical continuity of at least one of the electrical terminals associated with said first signal source.

20. (Previously presented) The apparatus of Claim 19, wherein said apparatus adapted to measure the difference comprises a computer program running on said digital processor.

21.- 31 (Cancelled)

32. (Previously presented) A method of determining the cardiac output of a living subject, comprising:

generating an electrical current;

applying said electrical current to at least a portion of said living subject;

measuring an impedance waveform generated by said electrical current passing through said living subject;

obtaining a cardiographic waveform from said subject during at least a portion of said act of measuring, said act of obtaining further comprising selecting one or more of a plurality of electrocardiographic (ECG) waveform inputs based on relative attributes of individual ones of said ECG waveform inputs;

converting at least a portion of said impedance and cardiographic waveforms to the digital domain;

removing at least one of respiration and motion artifact from at least one of said impedance and cardiographic waveforms;

determining stroke volume from the measured voltage; and

determining cardiac output based at least in part on said stroke volume.

33. (Previously presented) The method of Claim 32, wherein the act of determining stroke volume comprises determining ventricular ejection time (VET) and the derivative of impedance, and calculating stroke volume based at least in part thereon.

34. (Previously presented) The method of Claim 33, wherein the act of determining cardiac output comprises multiplying stroke volume and cardiac rate.

35. (Previously presented) The method of Claim 32, wherein said act of determining stroke volume comprises detecting at least one fiducial point within said impedance waveform using a wavelet transform.

36. – 39. (Cancelled)

40. (Previously presented) The method of Claim 32, wherein said act of selecting comprises evaluating the signal quality of each waveform based on at least R-wave signal amplitude.

41. (Previously presented) The method of Claim 40, wherein said R-wave signal amplitude is determined by:

identifying a first R point value;

subtracting the previous local minimum point value.

42. (Previously presented) The method of Claim 41, further comprising:

summing the amplitudes of those R points found in a predetermined time window which includes said first R point value; and

averaging said summed amplitudes to determine a mean R wave signal amplitude.

43. – 45. (Cancelled)

46. (Previously presented) The method of Claim 32, further comprising determining cardiac rate at least in part from said one selected ECG waveform.

47. (Previously presented) The method of Claim 32, further comprising outputting said stroke volume and/or said cardiac output determinations to a monitoring device according to a communications protocol.

48. (Previously presented) The method of Claim 32, further comprising outputting said stroke volume and/or said cardiac output determinations via a network interface to a remote monitoring device.

49. – 59. (Cancelled)

60. (Previously presented) Yoke apparatus adapted to measure cardiac output in a living subject, comprising:

a stimulation source adapted to produce a stimulation current;

a first interface adapted to receive;

(i) first signals from at least one electrodes, said first signals being related to the thoracic impedance of said subject resulting from the application of said stimulation current thereto; and

(ii) second signals from at least one electrode, said second signals being related to the ECG of said subject;

at least one digital processor adapted to process at least one of said first and second signals, said at least one digital processor having at least one computer program running thereon, said at least one computer program comprising three modules, said three modules comprising:

(i) an initialization module;

(ii) an operating module; and

(iii) a processing module; and

a second interface adapted to at least provide output data to a monitoring device;

wherein said yoke apparatus is adapted to be physically separable from said monitoring device.

61. (Previously presented) The yoke apparatus of Claim 60, further comprising:

at least one analog-to-digital converter, said at least one converter adapted to convert said first and second signals to the digital domain for processing.

62. (Previously presented) The yoke apparatus of Claim 61, wherein said at least one computer program is further adapted to detect a plurality of fiducial points with at least said first signals.

63. (Previously presented) The yoke apparatus of Claim 62, wherein said detection of said fiducial points is accomplished using discrete wavelet transforms.

64. (Previously presented) The yoke apparatus of Claim 60, wherein said second interface comprises a wireless interface adapted to transfer a plurality of data bytes between said yoke and said monitoring device.

65. (Previously presented) The yoke apparatus of Claim 61, wherein said wireless interface comprises a Wireless Medical Telemetry Service compliant radio frequency (RF) interface.

66. (Previously presented) The yoke apparatus of Claim 60, wherein said second interface comprises a LAN network card adapted to transfer data between said yoke and at least one remote network node.

67. (Previously presented) The yoke apparatus of Claim 60, wherein said second interface is adapted to transmit said output data as a plurality of data packets.

68. (Previously presented) The yoke apparatus of Claim 60, wherein said second interface further comprises at least one power terminal adapted to receive electrical power from said monitoring device.

69. (Previously cancelled)

70. (Previously presented) The yoke apparatus of Claim 61, further comprising an outer housing of molded construction, wherein said second interface comprises a multi-pin electrical connector.

71.-73. (Cancelled)

74. (Previously presented) The yoke apparatus of Claim 60, further comprising a microprocessor and data storage device, said microprocessor, data storage device, and said at least one digital processor being in data communication, said microprocessor at least controlling the transfer of data between said yoke apparatus and said monitoring device via said second interface.

75. (Previously presented) The yoke apparatus of Claim 60, wherein said first interface comprises a wireless data interface.

76. (Previously presented) The yoke apparatus of Claim 61, wherein said first interface comprises a wireless data interface.

77. (Previously presented) The yoke apparatus of Claim 60, further comprising a third interface, said third interface being adapted to receive data from a processing device, said processing device being adapted to determine at least one physical parameter of said subject .

78. (Previously presented) The yoke apparatus of Claim 60, further comprising a third interface, said third interface being adapted to transfer cardiac data to a processing device, said processing device being adapted to determine at least one physical parameter.

79. (Previously presented) The yoke apparatus of Claim 76, wherein said cardiac data comprises cardiac output (CO) data.

80. – 86. (Cancelled)

87. (Previously presented) Cardiac output measuring apparatus, comprising:

a stimulation source adapted to produce a stimulation current;

a first interface adapted to receive;

(i) first signals from a first signal source, said first signals being related at least in part to said stimulation current; and

(ii) second signals from a plurality of second signal sources, said second signals being useful in the determination of cardiac output;

said first interface further adapted to select at least one of said plurality of second signal sources based on relative attributes between individual ones of signals received from said plurality of second signal sources; and

a second interface adapted to at least provide output data to a monitoring device.

88 – 93. (Cancelled)

94. (Previously presented) Cardiac output measuring apparatus, comprising:

a stimulation source adapted to produce a stimulation current;

a first interface adapted to receive;

(i) first signals from a first signal source, said first signals being related at least in part to said stimulation current; and

(ii) second signals from a second signal source, said second signals being useful in the determination of cardiac output from a living subject;

a second interface adapted to at least provide output data to a monitoring device; and

a computer program adapted to identify at least one fiducial point within at least said first signals using only additions and multiplications of real numbers.

95 – 98. (Cancelled)

99. (Previously presented) ICG module apparatus, comprising:

a first interface adapted to receive impedance and ECG signals from a living subject, said first interface adapted to select individual ones of said ECG signals based on relative attributes analyzed between said individual ones of said ECG signals;

at least one filtration element adapted to filter at least portions of at least one of said impedance and ICG signals to create filtered signals;

at least one ADC adapted to convert at least a portion of said filtered signals to the digital domain;

a first processor having a computer program running thereon and adapted to at least control input and output functions of said module;

a second processor in data communication with said at least one ADC and having algorithms running thereon adapted to process said digital domain data to produce an output; and

a second interface operatively coupled to said second processor and adapted to provide said output to an external device.

100. (Previously presented) The apparatus of Claim 99, further comprising at least one DAC in data communication with said second processor and adapted to convert said output to an analog form before delivery to said second interface.

101. (Cancelled)

102. (Previously presented) The cardiac output measuring apparatus of Claim 1, wherein said relative attributes are selected from the group consisting of:

(1) R-wave magnitude;

(2) QR interval difference; and

(3) RR interval difference.

103. (Previously presented) The yoke apparatus of Claim 60, wherein any one of said three software modules can be downloaded independent of the other two modules.

104. (Previously presented) Cardiac output measuring apparatus having a selectively

reconfigurable software architecture, the apparatus comprising:

a stimulation source adapted to produce a stimulation current;

a first interface adapted to receive;

(i) first signals from a first signal source, said first signals being related at least in part to said stimulation current; and

(ii) second signals from a second signal source, said second signals being useful in the determination of cardiac output; and

at least one digital processor adapted to process said first and second signals, said at least one digital processor having at least one computer program running thereon, said at least one computer program comprising three functional and substantially independent software modules; and

a second interface adapted to at least provide output data to a monitoring device;

wherein any of said three software modules can be selectively reconfigured via download to said apparatus substantially independent of the other two modules.

105. (Previously presented) The cardiac output measuring apparatus of Claim 104, wherein said three modules comprise: (i) an initialization module; (ii) an operating module; and (iii) a processing module; and wherein:

said initialization module comprises a real-time, memory-resident, substantially event driven program adapted to monitor at least process scheduling, input and output, and inter-process communication functions within said apparatus;

said operating module is adapted to control interrupts, internal memory, stack pointer, and initial program counter functions; and

said processing module is configured to execute at least one bioimpedance determination algorithm.